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RECOVERING A PUMP LOST IN A DEEP WELL[1]

By W. A. Judd

Well no. 9 at Mason City starts with a 19-inch hole which continues for 225 feet. At that point the diameter is reduced to 16 inches and at 540 feet it is again reduced to 12 inches. The well is 1200 feet deep. In this well is installed a five-stage 17-inch American deep-well motor-driven turbine. The turbine proper is about 90 feet below the well curb and below the turbine are two lengths of 9-inch suction pipe. Water normally stands in the well about 85 feet below the curb and pumps down about 7 feet when yielding 1200 gallons per minute.

The construction of this type of pump and its connections are well known. The weight of the pump is carried by the 10-inch flanged discharge pipe in 8-foot lengths. Inside this discharge pipe is another pipe, 4 inches in outside diameter, held in position by spiders inserted in the flanges of the discharge pipe. This pipe is connected together by screw couplings which also serve to hold the shaft bearings. Inside this pipe is the shaft.

The pump is overhauled each year. On New Year's day, 1917, the pump had been lowered together with four lengths of discharge pipe, shaft casing and shafting. The fifth length of shafting had been screwed up tight and the fifth shaft casing was being set up solid when, without any warning, casing and shaft disappeared through the discharge pipe and with the pump and two lengths of discharge pipe went bubbling down to find a resting place on the ledge 225 feet below the surface. The two remaining lengths of discharge pipe were pulled out and it was found that in making up the shaft casing joint, the discharge pipe had worked loose from the flange.

A well driller's advice was immediately sought, and he recommended trying to couple on to the shafting, which projects about a foot above the bearings. One of the shaft couplings was taken to a machine shop and the threads recut to make a loose fit. One end was tapered out on the inside and the other end was cut down to take a 2-inch pipe coupling. On the bottom was soldered a heavy funnel to center the coupling over the shaft. Two-inch pipe was then cut into about 10-feet lengths for ease in handling and threaded. Because the shafting has a left-hand thread, it was necessary to drill each pipe coupling after the joint was made up and pin the pipe and coupling together. This was a tedious process, but finally the funnel was heard to strike the shaft. It was then raised and lowered a few times to be sure of centering and the men began to twist the pipe to the left. After several attempts, it seemed to take hold and hoisting was attempted with an 8-ton chain hoist which hangs from a trolley running on a 15-inch I-beam near the roof of the pump house. From the hard pull, it was known that the coupling caught hold of the shaft, but at about the third pull on the chain, the coupling became loose and for a day the men fished continuously without getting another nibble. The string of pipe was then pulled out and it was found that the funnel had bent over, allowing the shaft to center in the funnel to one side of the coupling. A heavier funnel was built, reinforced with steel ribs and bands, but even with this there was no luck, the shaft turning every time the threads engaged.

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[1] Read before the Iowa Section, October 10, 1917.

During this time one of the men had been telling of a fishing tool he had heard of, consisting of two rings. Just how the rings were operated no one knew until the blacksmith started to make such a tool. The small end of the funnel was cut off so the hole through it was about 5 inches in diameter. A fork was made to which the funnel was riveted. Above the fork was welded a piece of 2-inch shafting 3 feet long in such a way that when the shaft and funnel were vertical, the face of the steel was about 2½ inches from a vertical line drawn through the center of the funnel. On the back of this bar, two ears were welded and punched for a 1-inch bolt. Two open rings were made, 5 inches in diameter, of ¾ inch square steel with the ends bent back, flattened out and punched for a 1-inch bolt. The top of the bar had a piece of 2-inch pipe welded to it, the rings were bolted to their places and wired together so they would move together on the bolts and a light wire was fastened to the top ring to hold them in a horizontal position.

The whole apparatus was then lowered into the well with the same 2-inch pipe, the wire being paid out as the tool descended. The funnel centered the tool over the shaft casing all right, but when the rings were dropped by slacking on the wire, they did not bite into the casing enough to stand a pull so the tool was again pulled out, a tool-steel face put on the rings, and then notched. A piece of flat tool steel was welded to the face of the vertical bar, and in it were cut some teeth, making it look like a wood rasp. The tool was again lowered and caught hold of the shaft casing with a grip that scarcely anything could disengage. At the first pull it was evident that the pump was wedged tightly into the well, for instead of the pump rising, the I-beam above was bending. Men were sent for props to put under the beam, but while they were gone, the tension on the hoist suddenly slackened, showing that the pump was loose in the well and pulling was started. After pulling continuously for several hours the pump was landed on blocking on the well curb and those who had been fairly on needles for a week went home and to sleep undisturbed by dreams of a big fire and no water.